

Dear Colleague:

With the start of the new fiscal year, we are hard at work on reviewing cooperative agreement applications from state and local health departments. As policymakers and others become more concerned about tuberculosis (TB), more funding is being appropriated for TB prevention and control. In fact, from fiscal years 1993 to 1994, funding for CDC to spend on TB prevention and control increased from approximately \$104 million to more than \$142 million. We hope that this funding will allow health departments to expand many services, such as directly observed therapy (DOT) and other outreach services.

In November two meetings on TB prevention and control were held in Atlanta. On November 8 and 9, the Advisory Council for the Elimination of Tuberculosis (ACET) met to review draft statements on the model TB program, vaccination with bacille Calmette-Guérin (BCG), and TB control in correctional facilities; during the meeting, they also decided to issue a new statement on screening for TB. CDC staff updated the council on training and educational activities in the Division of Tuberculosis Elimination (DTBE), legislative and funding issues, the three model TB centers, 1992 surveillance data, recent outbreak investigations and follow-up investigations, 1992 program management reports, TB hospital surveys, and upgraded laboratory capabilities for diagnosis and epidemiologic support.

Another meeting, a workshop on TB modeling that was sponsored by the Robert Wood Johnson Foundation, took place on November 18 and 19. Participants in the workshop, who came from the World Health Organization, the International Union Against Tuberculosis and Lung Diseases, and universities and research organizations throughout the world, met to explore the ways models can be used for forecasting the incidence of TB and for guiding global TB control strategies. They also made suggestions about which kinds of data are most needed for developing new models.

To strengthen our ties with TB control groups worldwide, we have chosen an assistant director for international activities, Nancy Binkin, M.D. (see Personnel Notes in this issue of *TB Notes*). Dr. Binkin will coordinate our global TB control efforts and serve as our liaison to the World Health Organization, the International Union Against Tuberculosis and Lung Diseases, and other international groups.

We have also created the Prevention Effectiveness Studies Unit in the Clinical Research Branch. Staff in this unit — three medical epidemiologists, a research psychologist, and a medical anthropologist — will use a variety of research methodologies to assess the effectiveness of TB prevention and control strategies.

In the area of training and education, we have produced several new materials, such as a booklet on TB and HIV for health care workers and a videotape on how to conduct a TB interview (see New Publications in this issue of *TB Notes*). We are also developing a voice information system for health care professionals and others who call the division. Designed to answer many routine questions about TB, the system will be able to provide up-to-date information by voice, fax, or mail. Callers who choose to listen to the voice recordings will be able to receive general information about TB or specific information about treatment, diagnosis, BCG, infection control, or screening. Callers who would like written information will be able to choose from a variety of topics and then receive information sheets by fax or a packet of educational materials by mail. Look for more news on this system, which should be installed by the spring of 1994.

Kenneth G. Castro, M.D.

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NOTE: The use of trade names is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

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Detroit TB Program Arranges for Shelter to House Homeless TB Patients

An unstable living environment can complicate treatment for TB. Many TB patients are homeless and are unable to stay in one location for more than a day, which makes it difficult for them to receive directly observed therapy and to complete treatment. If inadequately treated, these patients may spread TB to others or require hospitalization.

The Detroit TB program has a staff of 6 persons (2 registered nurses and 4 community health aides) who deliver medication to more than 50 homeless TB patients every day. The staff reach these patients in shelters, soup kitchens, bars, and other locations.

To help the homeless patients complete treatment and to break the cycle of TB transmission, the TB program made an arrangement with the Coalition on Temporary Shelter (COTS), a local shelter for the homeless. COTS will house TB patients who are homeless, and it will work closely with the TB

program and other medical and sheltering programs to provide advocacy, counseling, and social services to the patients.

Every day the TB program sends a registered nurse to COTS to administer medications as prescribed by the physician, to assess the condition of the patients, and to screen other residents and provide follow-up care. The TB program also transports the patients to and from the TB clinic for medical follow-up.

The TB program set up a monthly payment system with COTS that is consistent with the rates paid by the Department of Social Services. The arrangement includes housing (total of eight beds); towels, bed sheets, and laundry service; and three meals per day for each TB patient. Most patients stay at the shelter for 3 to 18 months, but the length of stay varies according to the patient. The TB program estimates that the arrangement will cost \$29,448 per year.

The TB program must approve all admissions to COTS. This way, the program is able to ensure continual care for the patients and maintain accountability for the coordinated efforts

of both agencies.

*—Reported by Kathy Harris
Detroit TB program*

Health Departments Cooperate to Provide Contact Investigation and Follow-up Across State Lines

In April 1993 a man who had been coughing for approximately 3 weeks was hospitalized in New York State because of severe respiratory distress. He died in May; autopsy findings revealed that the man had TB. While doing a contact investigation, public health officials at the New York State Department of Health learned that the man had been with a traveling circus for several months before coming to New York. The circus had been touring the Midwest in a series of one-night engagements; at the time of the contact investigation, the circus was in Minnesota.

The New York State health department notified the TB program of the Minnesota Department of Health and requested that the Minnesota TB program screen all persons who had been in contact with the patient. In Minnesota, tuberculin skin tests were administered to 68 of the 72 persons traveling with the circus (2 persons were not tested because they were not with the group at the time, 1 was not tested because he left the circus during the investigation, and 1 was tested but did not return for a reading). Of the 68 people who were tested, 11 (16.1%) had positive skin test results; 6 others had negative skin test results but had symptoms suggestive of TB.

On learning that the circus was headed for Wisconsin, staff of the Minnesota TB

program called the Wisconsin TB program. They advised them of the investigation and arranged for the 11 people with positive skin test results and the 6 people with negative results who had symptoms to be evaluated with chest radiographs at a private clinic in LaCrosse, Wisconsin.

In Wisconsin, preventive therapy was prescribed for 4 of the 17 circus members who had been evaluated with chest radiographs. In addition, 1 of these 17 circus members was found to have an abnormal chest radiograph and to be smear positive for acid-fast bacilli; this person was hospitalized and prescribed a 5-drug treatment regimen for TB. Later, culture results confirmed the diagnosis of TB. When the patient's sputum smears were negative, he was transferred to the circus headquarters in Florida, where he was met by an outreach worker from the Florida TB program.

Staff at the circus headquarters in Florida kept the CDC program consultant for Region V (comprising Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin) informed of the circus's itinerary. In northern Illinois, the next stop after Wisconsin, the regional nursing supervisor from the Illinois Department of Health visited the circus to give a medical evaluation to the persons receiving preventive therapy. When the circus left the Midwest, the CDC program consultant notified the TB programs in the states the circus would be visiting and made arrangements for follow-up care for the

persons receiving preventive therapy. Staff of the TB programs in Michigan, Maine, and New York State also provided follow-up care.

—*Reported by Michelle McMacken
and Phyllis Cruise
Division of TB Elimination*

Oregon Prints T-Shirts to Spread TB Message

Residents of Multnomah County, Oregon, are wearing a message about TB. With the help of a local high school, the Multnomah County Health Department has printed T-shirts bearing the slogan "TB or not TB — no longer the question" and a picture of Shakespeare. The health department logo and phone number are printed on the back of the shirt.

Oregon had 146 TB cases in 1992, for a case rate of 4.9 per 100,000. Many of the cases were in foreign-born persons. The health department printed the T-shirts because they wanted to educate this group and other high-risk populations, such as homeless persons and the elderly, about TB and to motivate these groups to seek screening and follow-up care. They also wanted to use the shirts as an incentive for patients and as a gift for the many members of the business community who donated to the incentive program.

The health department held a contest for the shirt design. The printing costs were low because printing was done at

a local high school as part of the school's vocational education program. The shirts have been extremely popular.

—*Reported by Chareundi Van-Si, MSW,
and Sandra Chisholm, MS
TB Management Clinic
Multnomah County Health Department*

Think TB Poster Triggers Case Findings

Two previously undetected cases of TB were discovered as a result of the *Think TB* poster displayed in the waiting room of the DeKalb County, Georgia, TB clinic. A 23-year-old woman was referred to the clinic because she had a positive reaction to a tuberculin skin test administered during a preemployment screening. The woman had no symptoms of TB, and her chest radiograph findings were normal.

While in the waiting room, the woman noticed the *Think TB* poster. This poster, originally developed by the Mississippi Department of Health and reprinted by CDC, lists the signs and symptoms of TB. When the woman spoke with the nurse, she mentioned that she had a 5-year-old child at home who had many of the symptoms noted on the poster.

A referral was made for the child to be examined immediately. Upon examination, the child was found to have TB. During the contact investigation, the child's grandfather was also found to have undiagnosed

pulmonary TB. The grandfather took care of the child during the day.

Health care workers cannot always give thorough, one-on-one education about TB to each person attending the clinic. This incident exemplifies the benefits of educational materials in efforts to eliminate TB.

*—Reported by Ann McBride, RN
DeKalb County TB Program*

Tuberculosis Information Management System Will Aid in Case and Program Management

The Division of Tuberculosis Elimination (DTBE), CDC, is developing a software package for health departments to use in managing TB patients and their contacts, as well as persons suspected of having TB and persons receiving preventive therapy. Called the Tuberculosis Information Management System (TIMS), this software package will assist health departments in TB surveillance activities and in the overall management of TB public health programs.

TIMS is being developed in collaboration with state epidemiologists and selected staff of state and local TB control programs. In May 1993 a survey was sent to these persons to assess their needs for a computerized system. DTBE staff have been meeting

with software designers, using the results of the survey to define the needs for TIMS; they have produced a functional needs document to serve as a blueprint for TIMS. Everyone who received the initial survey was sent a copy of the functional needs document for comment. When the comments have been addressed, programming will begin.

TIMS will meet the need for a single, automated system for managing information in TB programs. Its features will include

- a. Full integration with Software for Expanded Tuberculosis Surveillance (SURVS-TB);
- b. Ability to run efficiently in stand-alone and multiuser environments;
- c. Password-protected access to the software to maintain confidentiality;
- d. Ability to transfer selected data from the end user to progressively higher levels;
- e. Flexibility for every level of user to ensure that TIMS meets individual needs for managing patients and programs; and
- f. Ability to incorporate data previously collected in SURVS-TB and the Tuberculosis Database System (TBDS).

*—Reported by Craig Studer
Division of TB Elimination*

National Jewish Center and CDC Introduce the National Registry for Nontuberculous Mycobacterial Diseases

As a major referral center for patients with mycobacterial infections, National Jewish Center for Immunology and Respiratory Medicine has observed an apparent increase in the incidence of pulmonary infections caused by nontuberculous mycobacteria (NTM) in patients *without* HIV infection. Pulmonary and infectious diseases specialists throughout the country who use the mycobacterial diseases consultation service at National Jewish Center have expressed a similar suspicion about the increased incidence of infections due to NTM. Because the reporting of these infections is rarely required under public health regulations, reliable incidence and prevalence data are not available.

To address this problem, National Jewish Center, in collaboration with CDC, has established the National Registry for Nontuberculous Mycobacterial Diseases. The goals are (1) to collect patient-based data that will be useful in determining the epidemiology and incidence of pulmonary disease due to NTM in patients not infected with HIV, (2) to provide a clinical database for information on treatment and outcome, and (3) to provide a clinical database for case-control studies. After cases have been registered, registry officials will designate sites to pursue active case

finding and collect complete incidence data. Registry officials will also develop a mechanism for submitting to and storing at CDC a subset of mycobacterial isolates for use in future epidemiologic investigations.

To initiate data accumulation in the NTM registry, National Jewish Center and CDC encourage clinicians to register cases of pulmonary disease due to NTM. To be registered, cases must be in patients who are HIV negative and who have

- two positive cultures (e.g., sputum) for NTM, obtained at least 2 weeks apart, or isolation of the organism from a normally sterile site (e.g., lung tissue or blood)
- established or progressive infiltrative or cavitary lung disease as evidenced by chest radiograph or computed tomography (CT) findings
- exclusion of all other reasonable causes for the disease (e.g., TB or fungal disease)

A toll-free number (1-800-5511-NTM) has been established at National Jewish Center for the registration of patients. Cases can also be registered with the registry director, Mimi Hackley, by fax (1-303-398-1476) or mail using the registry surveillance form. The registry surveillance form is designed to collect information about the physician, the demographics of the patient, the source of the specimen, the mycobacterial species isolated, and the clinical characteristics of the patient at

diagnosis. For more information about the registry, call Mimi Hackley at National Jewish Center or Steve Ostroff, M.D., of the National Center for Infectious Diseases, CDC (404-639-2603).

As the data in the registry accumulate and are analyzed, periodic updates will be provided to persons who registered cases. Studies derived from this information will lead to a better understanding of the epidemiology of infections due to NTM. Moreover, these studies should provide a basis for improving case definitions, interventional strategies, and hypotheses and experimental designs for future clinical trials.

*—Reported by Mimi Hackley, MPH
National Jewish Center
for Immunology and Respiratory Medicine*

before sending them to CDC. (Approximately 30% of the reports currently received by DTBE contain errors.) States that receive program management reports from local areas can use the software to combine reports for a state summary. When reports come to the state office, they can be edited and corrected as needed. Correct reports can then be stored until all the city and county reports have been received. The data can then be combined into a summary for the state.

Staff of state and local TB programs who would like a copy of the software should call their CDC program consultant at (404) 639-8126. This software is available only to TB programs in states that submit program management reports to CDC.

*—Reported by Don Brown
Division of TB Elimination*

New Program Management Software Available for State and Local TB Programs

A system for editing and combining program management reports has been developed by DTBE and is now available for state and local use. This software will edit, store, combine, and print program management data.

The Program Management Report Editing/Combining System provides state and local areas with another way to check the mathematical accuracy of their program management summaries

UPDATE FROM THE LABORATORY

Polymerase Chain Reaction

The resurgence of TB and the recent outbreaks of multidrug-resistant disease underscore the need for the rapid laboratory detection, isolation, identification, and drug susceptibility testing of *Mycobacterium tuberculosis* in clinical specimens. Microscopy is the simplest and fastest procedure currently available for detecting acid-fast bacilli in clinical specimens. Unfortunately, the procedure is not very sensitive; it requires about 5×10^3 bacilli per ml of specimen. Thus, as many as 30% to 50% of patients with pulmonary TB have negative sputum smear results. In addition, microscopy cannot identify the 54 recognized species of mycobacteria.

For a definitive diagnosis of TB, the infecting organism must be isolated on a culture medium and identified. The laboratory culture of *M. tuberculosis* is sensitive (10 to 100 viable bacilli per specimen), but it is hampered by the slow growth rate of the bacilli. Standard culture methods with solid media require incubation for 3 to 6 weeks before sufficient growth is obtained to begin identification methods.

Conventional biochemical tests for the species identification of mycobacteria require the additional growth of the organism; results of culture and species identification may not be available for 6 to 9 weeks after the specimen is collected. Using more rapid techniques for primary culture (e.g., radiometric

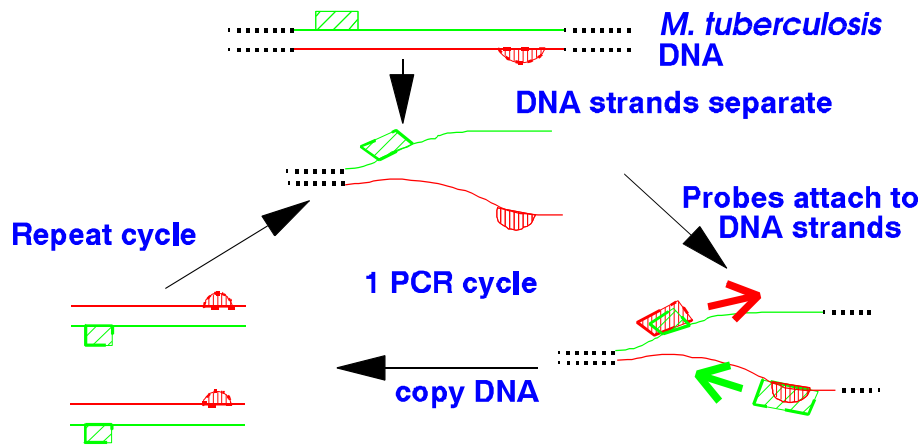
techniques such as BACTEC) and newer methods for species identification, including nucleic acid probes, high-performance liquid chromatography (HPLC), or the BACTEC NAP test, can shorten to about 2 weeks the time needed to make a definitive diagnosis of TB.

Although the new diagnostic methods can greatly reduce the time needed to isolate and identify *M. tuberculosis*, a method for detecting bacilli directly in clinical specimens would significantly improve the control of TB transmission in hospitals and in the community. The most widely studied technique for this purpose is the polymerase chain reaction (PCR). PCR works by increasing the amount of DNA in a mycobacterial specimen to a level at which it can be easily detected. Unique DNA sequences have been identified that are specific to each member of the genus *Mycobacterium*, as well as to each of several species of mycobacteria. Complementary pieces of DNA (probes) can be made that will bind only to the unique sequences in the mycobacteria. When the mycobacterial DNA is heated, the two strands separate, allowing the probes to bind to their targets. The addition of DNA polymerase (an enzyme) and nucleotides (the building blocks of DNA) catalyzes the synthesis of another strand of DNA identical to the unique sequence found in the mycobacteria. By repeating this process many times, it is possible to amplify a single sequence of mycobacterial DNA a millionfold, to a level at which the DNA can easily be

detected either through staining or radioactive labeling techniques. If the probe does not find the appropriate target, it will not bind, and DNA will not be amplified.

How can this technique be used to diagnose TB more quickly? Clinical specimens such as sputum, urine, or biopsy tissue can be processed and used directly in a PCR assay. If the sample contains mycobacteria, the DNA will be amplified and detected. If the sample contains no mycobacteria, the test result will be negative.

Polymerase Chain Reaction (PCR)



After 25-30 cycles,
check for DNA through
staining or radioactive
labelling

- o Can detect one DNA molecule in 10^5 cells
- o # DNA copies generated = 2^n , where n = # of cycles
- o One cycle \sim 6.25 minutes
- After 25 cycles (2.6 hrs) one gene copy $\Rightarrow 3.36 \times 10^7$ copies

PCR has several advantages. First, it can be performed in only a few hours. Second, it can detect very small numbers of bacilli, perhaps even as few as one organism. Third, it is very specific: probes can be made that bind to DNA from all mycobacteria or to DNA from individual species, such as *M. tuberculosis* or *M. avium*. Finally, unlike standard culture techniques, PCR does not require the presence of viable organisms; PCR can be performed on fixed tissue specimens or on specimens that contain dead bacilli.

PCR assays specific to *M. tuberculosis* have been shown in small trials to be relatively sensitive and highly specific.

However, more efficient methods of obtaining DNA from mycobacteria in clinical specimens must be developed before the assay is sufficiently sensitive for routine clinical use. In addition, laboratories that plan to perform the assay will need to obtain special equipment and to train laboratory workers to do the assay. In the future, PCR could allow a definitive diagnosis of TB to be made within 1 day of specimen collection. A commercially produced PCR assay is being evaluated for its usefulness in diagnosing mycobacterial diseases. Until the evaluation is complete, PCR should be considered an experimental technique, and it should not be used for the routine diagnosis of TB (see the Notice to Readers in *MMWR*. 1993;42:686).

—Reported by Robin Huebner, PhD, MPH
Division of TB Elimination

NEWS BRIEFS

- On July 6, 1993, licensed streptomycin sulfate became available at no cost directly from the manufacturer, Pfizer Pharmaceutical. On initial request, Pfizer will send a 2-month supply of streptomycin sulfate in the form of six 10-packs of 1 g or 2.5 ml ampules for injection. To make an initial request or to request a refill, call Richard Vastola at (800) 254-4445.
- Para-aminosalicylic acid (PAS) is available from the CDC Drug Service. A new formulation, consisting of extended-release granules, is being distributed. On initial request, the CDC Drug Service will send at no cost a 2-month supply of PAS granules. To enroll patients into the CDC Investigational New Drug (IND) PAS protocol, call (404) 639-3670.
- CDC awarded a cooperative agreement to a national minority organization, the Association of Asian Pacific Community Health Organizations (AAPCHO). This organization will provide training and technical assistance on TB for staff in community health centers and clinics, community-based organizations, hospital-based clinics and teaching hospitals, health departments, and associations that provide TB control services to the Asian and

Pacific Islander communities. Special attention will be given to organizations in geographic areas with high TB case rates for Asian and Pacific Islander communities.

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- The Minnesota state legislature has passed legislation requiring all correctional facilities in the state to conduct Mantoux tuberculin skin testing of inmates who have been in the facility for 7 days or more. Juvenile temporary holdovers are excepted from the legislation, which was effective January 1, 1994.
 - Every Wednesday night, the full text of the following Friday's issue of *Morbidity and Mortality Weekly Report (MMWR)* is entered into the Public Health Network. Anyone who has access to the Public Health Network can read, download, or print the *MMWR* articles before they are published.
 - Three errors were made in a recent CDC publication, "Initial Therapy for Tuberculosis in the Era of Multidrug Resistance" (*MMWR*. 1993;42:1-8).
 1. In Table 1, the first two sentences of Option 1 should read "Administer daily INH, RIF, and PZA for 8 weeks followed by 16 weeks of INH and RIF daily or 2-3 times/week. In areas where the INH resistance rate is not documented to be <4%, EMB or SM should be added to the initial regimen until susceptibility to INH and RIF is demonstrated."
 2. In Table 2, the daily dose of ethambutol for adults should be 15-25 mg/kg. The daily dose of streptomycin for children should be 20-40 mg/kg.
 3. In Table 2, maximum doses should not be listed for the 2 times/week or 3 times/week dosages of ethambutol or streptomycin. There are no data to support a specific maximum dose of these drugs for intermittent therapy.
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Model TB Centers Funded by CDC

In fiscal year 1993, CDC selected and funded three model TB centers, defined as sites providing (1) state-of-the-art diagnostic, treatment, prevention, and patient education services; (2) innovative approaches to TB prevention and control; and (3) training for all levels of health care workers who provide TB-related services. The model centers will be in Newark, New Jersey; New York City; and San Francisco.

The New Jersey model center is being established at the National Tuberculosis Center of the University of Medicine and Dentistry of New Jersey. The center will serve the city of Newark and surrounding Essex County, where the medical school is located. It will emphasize directly observed therapy and training, as well as the use of interdisciplinary case management teams to meet patients' needs for health and social services. The goal is to improve treatment and adherence for TB patients. This model center will also contract with the Leonard Davis Institute of Health Economics (LDI) at the University of Pennsylvania to assess approaches to patient adherence, provide management training, consult on program operations, and analyze the cost-effectiveness of the center.

The New York City model center is being established at the Harlem Hospital Center. It will serve the communities of Central and East

Harlem, where case rates for TB and MDR TB are among the highest in the country. The cornerstone of this TB model center will be increased clinical services for TB patients. The model center will also stress DOT, and it will feature case management teams to address patients' needs in physical and mental health, housing, and social services. This well-rounded approach to case management will help ensure that each TB patient completes treatment.

The San Francisco TB model center is being guided by the San Francisco Department of Public Health, Division of TB Control. The center, to be housed at the TB clinic at San Francisco General Hospital, will serve several counties surrounding the city of San Francisco. A major goal is to imitate the successful efforts of the San Francisco TB program, which now meets or exceeds most national prevention and control objectives, in TB programs in neighboring Bay Area counties. The San Francisco model center will feature an extensive training program and special initiatives targeted to all of northern California that would enhance TB surveillance, improve laboratory capabilities, develop an institutional TB "hazard evaluation" service, and provide clinical and epidemiologic consultation services.

The model centers aim to collaborate with other organizations, including governmental offices, academic and health care institutions, voluntary agencies, and community-based

organizations. In addition, all three model centers plan to offer TB-related training to health care workers in their service areas. CDC hopes that the model centers will eventually be able to provide training to TB program personnel from across the country.

*—Reported by Russ Havlak
Division of TB Elimination*

STUMP THE EXPERTS

Q: Should isoniazid (INH) be used for preventive therapy for TB-infected persons from countries where isoniazid-resistant TB is prevalent (assuming the source case and the drug susceptibility pattern of the source case are unknown)?

A: There is no easy answer to this question. We know that INH preventive therapy is effective in preventing the development of active TB when the infecting strain of *M. tuberculosis* is susceptible to INH. For persons infected with a strain that is resistant to INH but susceptible to rifampin (RIF), CDC recommends RIF as an alternative to INH for preventive therapy. For example, RIF would be a good choice for preventive therapy for a newly infected person who was exposed to a patient with TB resistant to INH but susceptible to RIF.

When the source case is unknown and the infected person is from an area where INH resistance is common, the choice of a drug for preventive therapy becomes more complicated. From 1979 through 1982, Nolan and colleagues studied the outcome of INH preventive therapy in refugees from Southeast Asia (*Am Rev Respir Dis.* 1986;133:431-436). (The rates of INH resistance for culture-positive TB cases in

Southeast Asian refugees were estimated by Nolan and colleagues in a later study [*Am Rev Respir Dis.* 1988;137:805-809]: of 36 culture-positive cases, 5 (13.8%) were resistant to INH.) The researchers found that for this group, INH preventive therapy was "less than optimal" for preventing disease due to INH-resistant organisms, even when the drug was taken properly.

In determining which drug to use for preventive therapy in this situation, clinicians must weigh several factors: the individual circumstances, including the likelihood of resistance to INH; the effectiveness of the suggested drug or drugs; and the cost of using the drug or drugs for preventive therapy. Koplan and colleagues used decision analysis and the Delphi technique to compare outcomes of using different drugs for preventive therapy (*JAMA*. 1980;244:2736-2740). They conclude that when the probability of INH resistance is very low, INH should be used for preventive therapy because it is relatively inexpensive and is known to be effective in this situation. They suggest that as the probability of INH resistance increases, the effectiveness and the cost of using alternative regimens, such as RIF, RIF and INH, or RIF and ethambutol, must be taken into consideration. More TB cases may be prevented with these alternative regimens, but the cost will be much higher. However, when the probability of INH resistance is very high, an alternative regimen is likely to be more effective than INH in preventing cases. In this situation, the increased effectiveness of the alternative regimen may outweigh its increased cost.

One important conclusion of the Koplan analysis is that not using any preventive therapy at all would result in many more TB cases than would any of the regimens. Clinicians should carefully consider the patient's medical history, the effectiveness of a regimen, and the cost of a regimen, and they should offer

preventive therapy when appropriate.

—*Response by Pattie Simone, MD*
Division of TB Elimination

We welcome your questions. Please fax them to us at (404) 639-8604 (attn: Editor, *TB Notes*).

BEHAVIORAL SCIENCE NOTES

When TB Treatment Fails

An article entitled "When Tuberculosis Treatment Fails: A Social Behavioral Account of Patient Adherence" was recently published in the *American Review of Respiratory Disease* (Vol. 147, pp 1311-1320, 1993). This article is a review of the literature about adherence to TB medications and a summary of the research on measuring adherence, predicting adherence, the relationship between the patient's culture and the level of adherence, and interventions to improve adherence.

Because there is no gold standard for measuring adherence, multiple measures, such as careful monitoring early in treatment, targeted patient interviews, urine assays, and pill counts, should be used. It is very difficult to predict whether a patient will take medications. However, two factors seem to be associated with adherence: the presence of social support and the belief of the patient that the problem of TB is serious. Several studies have documented a relationship between the patient's culture and the level of adherence; culturally influenced misinformation and stigmatization seem to be important factors. The most successful programs for improving adherence have used multiple strategies, including outreach services, supervised therapy, comprehensive case management, and additional social service assistance to patients.

The article suggests additional areas for research, such as patient-provider communication, the relationship between the health care infrastructure and the outcome of therapy, and operational issues such as case management, records management, staff training and supervision, and the interaction between community organizations and the clinic. The challenge for researchers is to identify and describe a complex array of factors that may influence treatment outcomes.

The goals of the article were to provide background for researchers, to stress that adherence to treatment is complex, and to recommend the use of innovative and comprehensive approaches to improve patient outcomes.

The following articles provide more information about adherence:

Meichenbaum D, Turk DC. *Facilitating Treatment Adherence: A Practitioner's Guidebook*. New York, NY: Plenum Press; 1987.

Gerber KE, Nehemkis AM, eds. *Compliance: The Dilemma of the Chronically Ill*. New York, NY: Springer, 1986.

DiMatteo MR, DiNicola DD. *Achieving Patient Compliance: The Psychology of the Medical Practitioner's Role*. New York, NY: Pergamon Press; 1982.

Haynes RB, Taylor DW, Sackett DL, eds. *Compliance in Health Care*. Baltimore, Md: The Johns Hopkins University Press; 1979.

Kirscht JP, Rosenstock IM. Patients' problems in following recommendations of health experts. In: Stone GC, Cohen F, Adler NE, eds. *Health Psychology: A Handbook*. San Francisco, Calif: Jossey-Bass; 1979.

Shumaker SA, Schron EB, Ockene JK, Parker CT, Probstfield JL, Wolfe JM, eds. *The Handbook of Health Behavior Change*. New York, NY: Springer; 1990.

Rubel AJ, Garro LC. Social and cultural factors in the successful control of tuberculosis. *Public Health Rep*. 1992;107:626-36.

—Reported by Esther Sumartojo, PhD
Division of TB Elimination

NEW PUBLICATIONS

Recently, three documents were published that present statistics on TB morbidity and mortality in the United States:

CDC. Summary of notifiable diseases, United States, 1992. *MMWR*. 1992;41:1-73.

CDC. Tuberculosis morbidity — United States, 1992. *MMWR*. 1993;42:696-697,703-704.

Tuberculosis Statistics in the United States — 1991. Atlanta: Centers for Disease Control and Prevention; 1993.

Questions about the surveillance data should be referred to Ida Onorato, MD, or Eugene McCray, MD, of the Surveillance and Epidemiologic Investigations Branch, DTBE. Dr. Onorato's telephone number is (404) 639-8116; Dr. McCray's number is (404) 639-8117.

Journal Articles

Barnes PF, Barrows SA. Tuberculosis in the 1990s. *Ann Intern Med*. 1993;119:400-410.

CDC. Severe isoniazid-associated hepatitis — New York, 1991-1993. *MMWR*. 1993;42:545-547.

CDC. Tuberculosis in Philippine national World War II veterans immigrating to Hawaii. *MMWR*. 1993;42:656-657,663.

Daugherty JS, Hutton MD, Simone PM. Prevention and control of tuberculosis in the 1990s. *Nurs Clin North Am*. 1993;28:599-609.

Ellner J, Hinman A, Dooley S, et al. Tuberculosis symposium: emerging problems and promise. *J Infect Dis*. 1993;168:537-551.

Iseman MD. Treatment of multidrug-resistant tuberculosis. *N Engl J Med*. 1993;329:784-791.

Sumartojo E. When tuberculosis treatment fails: a social behavioral account of patient adherence. *Am Rev Respir Dis*. 1993;147:1311-1320.

Training and Educational Materials

Conducting a TB Interview [videotape]. Atlanta: Centers for Disease Control and Prevention; 1993. Designed for use in the interviewing and communication skills train-the-trainer course taught by CDC, this videotape presents a mock TB interview that course participants can discuss and evaluate. The interview demonstrates the techniques presented in the lecture and print materials for the course. The interviewing and communication skills course is provided several times a year to trainers who then use the course materials to train nurses, outreach workers, and public health advisors from local TB programs. The videotape will be shown to persons who attend the course and distributed only to persons who will teach the course.

TB/HIV: The Connection — What Health Care Workers Should Know. Atlanta: Centers for Disease Control and Prevention; 1993. Originally published in 1989, this booklet has

been revised and expanded. The newest edition contains basic facts about diagnosing, preventing, and managing TB in persons with HIV infection. It also includes new sections on the pathogenesis of HIV, anergy testing, contact investigation for TB, multidrug-resistant TB, and preventing and

treating TB in health care workers. The intended audience is health care workers. For copies, call the Voice Information System at (404) 639-1819 or call your state TB program.

TB Precautions [videotape]. Tucson: Medfilms, Inc; 1993. This 12-minute videotape, designed primarily for nursing staff, focuses on infection control. The videotape also reviews TB transmission, pathogenesis, diagnosis, and treatment. The cost is \$210 per videotape; the tapes are offered with a 30-day money-back guarantee. For copies, write to

Medfilms, Inc.
6841 N. Cassim Place
Tucson, AZ 85704

The American Correctional Health Services Association has produced a series of four videotapes of selected presentations from its March 1993 conference, Communicable Disease Crisis: Corrections and the Community. Intended for health care providers working in correctional facilities, the hour-long videotapes focus on TB, HIV, sexually transmitted diseases, and immunizations and hepatitis. The TB videotape features a presentation on public health opportunities and correctional health services (Walter Dowdle, PhD, deputy director of CDC), the epidemiology of TB in the United States (Dixie Snider, Jr, MD, associate director for science, CDC), and a survey of TB in correctional facilities (Ted Hammett, PhD, vice-president, ABT Associates, Inc). The cost is

\$89.95 per video or \$275 for the set of four. For copies, call Fran Rickenbach at (513) 223-9630.

PERSONNEL NOTES

Bernard Benecke was selected for the newly created public health advisor position in the Maine TB program. Working with the state epidemiologist and the staff of the disease control division, Bernard will have a key role in the management of the program. Since April 1992, Bernard had been assigned to the New Jersey TB program. He transferred to Augusta on August 22.

Nancy Binkin, MD, MPH, was chosen for the position of assistant director for international activities, DTBE. Nancy joined CDC in 1980 as an EIS officer; from 1980 to 1984 she worked in the Division of Reproductive Health. In 1984 she became chief of the Nutrition Epidemiology Branch, Division of Nutrition, CDC. Since 1990, Nancy has been in Rome, Italy, starting an epidemic intelligence service program for public health personnel in Italy. She has an MD from the University of California at San Diego and an MPH from the University of California at Berkeley. She joined DTBE on November 1.

Alan Bloch, MD, medical epidemiologist, transferred from the Surveillance and Epidemiologic Investigations Branch, DTBE, to the Program Services Branch.

Jim Carey, PhD, joined the Clinical Research Branch, DTBE, as a research anthropologist. Jim was in the HIV/AIDS postdoctoral program at

Emory University, and he has taught anthropology at Georgia State University. He is currently working toward an MPH at Emory University.

Lisa Gaston was chosen for the position of secretary in the Surveillance Section, Surveillance and Epidemiologic Investigations Branch, DTBE. A secretary in the Division of HIV/AIDS, National Center for Infectious Diseases, since May 1990, Lisa has also worked at the Internal Revenue Service. She joined DTBE on September 20.

Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, CDC. She had been a nurse

Andrew Heetderks was selected for a program consultant position in the Program Operations Section, Program Services Branch, DTBE. Andy has had TB field assignments to the Fulton County, Georgia, Health Department, the Miami-Dade County Public Health Unit, and since August 1989, the New York City Department of Health. He was a major contributor to the planning, initiation, and management of the public health associate training program in New York. Andy is the consultant for Regions VII and VIII. He transferred to Atlanta on September 19.

Melinda Hill was selected as a public health advisor in the Philadelphia TB program. Melinda came to work for CDC as a public health associate in August 1988. Her entry-level assignment was to the Atlanta-Fulton County STD/HIV prevention program; in September 1990 she transferred to the Philadelphia STD/HIV prevention program, where she eventually became a first-line supervisor. Melinda has a BA in English from the University of North Carolina. She transferred to the TB program on December 12.

Mary Hutton, RN, MPH, joined the

consultant in the Program Services Branch, DTBE, and a nurse epidemiologist in the Surveillance and Epidemiologic Investigations Branch, DTBE.

J. Scott Jones was selected for the newly created public health advisor position in the Kentucky TB program. Scott will be an assistant to the TB program manager for the state. Since July 1992, Scott had been assigned to the South Carolina TB program. He transferred to Frankfort on August 8.

Marnell Kretschmer was selected as a public health advisor in the Chicago TB program. A 1986 graduate of Eastern Illinois University with a BS in family services and psychology, Marnell came to work for CDC in July 1990 as a public health associate assigned to the Chicago STD/HIV prevention program. Since October 1991, she has been assigned to Winston-Salem, North Carolina, as a disease intervention specialist and first-line supervisor in the STD/HIV prevention program. She transferred to the Chicago TB program on November 14.

Matthew McKenna, MD, MPH, joined DTBE as a medical epidemiologist in the Surveillance and Epidemiologic Investigations Branch. Since July 1992, Matthew had been in the Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, where he was also an Epidemic Intelligence Service (EIS) officer from 1989 to 1991. From July 1991 to July

1992, Matthew was a preventive medicine resident at the DeKalb County, Georgia, Board of Health. He received an MD from Emory University and an MPH from the University of Pittsburgh. He joined DTBE on October 15.

Paul Moffat was selected as a public health advisor in the New Orleans TB program. Paul began his public health career in June 1990 as a public health associate assigned to Chicago STD/HIV prevention program. In April 1992 he was transferred to the Long Beach, California, STD/HIV prevention program, where he has been training new STD staff. A 1988 graduate of Eastern Michigan University with a BS in political science, Paul earned a master's degree in public administration at Wayne State University in 1990. He transferred to New Orleans on October 17.

Susan Lee, MD, MPH, joined the Clinical Research Branch, DTBE, as a medical officer. Since July 1992, Susan had been in the Surveillance and Epidemiologic Investigations Branch.

Renee Ridzon, MD, is a second-year EIS officer in the Clinical Research Branch, DTBE. Renee spent her first year of EIS in Boston, at the Massachusetts Department of Public Health. An internist with subspecialty training in infectious diseases, Renee joined DTBE in August 1993.

Nilka Rios, MT, MPH, was selected for the position of epidemiologist in the Clinical Research Branch, DTBE. Since 1992 Nilka had been with the Division of STD/HIV Prevention, CDC. She received a degree in medical technology at Ohio State University and an MPH in epidemiology at the University of Puerto Rico. She joined DTBE on November 1.

Joe Scavotto was selected for a program consultant position in the Program Operations Section, Program Services Branch, DTBE. Joe had been with the TB program in the Alabama Department of Public Health since November 1991; he also had TB field assignments to the Baltimore City Health Department and the Fulton County, Georgia, Health Department. Joe is the consultant for Region I. He joined the division on August 23.

Howard Smith joined the Computer and Statistical Services Activity, DTBE, as a local-area network (LAN) administrator. Howard had been a LAN administrator for the Internal Revenue Service in Atlanta; he started working at CDC on June 28.

Phil Smith, PhD, joined the Office of the Director, DTBE, as a statistician. Chief of the Statistics and Data Management Section, Division of Diabetes Translation, CDC, for the past 2 years, Phil has a PhD in statistical and computer science from the State University of New York at Buffalo. He joined DTBE on October 17.

Zachary Taylor, MD, MS, was selected for the position of medical epidemiologist in the Clinical Research Branch, DTBE. Previously a medical epidemiologist at the Agency for Toxic Substances and Disease Registry, Zach has an MD from the Medical College of Georgia and an MS in preventive medicine from the University of Maryland. He joined DTBE on November 1.

Tonya Thrash was chosen for the position of secretary in the Office of the Director, DTBE. For the past 2 years, Tonya has been a program assistant in the Office of the Associate Director for Minority Health, CDC. She joined DTBE on September 7.

Andrew Vernon, MD, MHS, was selected for the position of medical officer in the TB program of the Georgia Division of Public Health. Andrew was director of the Technical Support Division, International Health Program Office, CDC, and he has been an assistant professor of medicine at the Emory University School of Medicine. He has an MD from Harvard Medical School and an MHS in epidemiology from the Johns Hopkins School of Hygiene and Public Health. He was assigned to the Georgia TB program on November 1.

Ralph Wilmoth was selected for the public health advisor position in the Iowa TB program. Ralph came to work for CDC in July 1987 as a public health associate in the Winston-Salem, North Carolina, STD/HIV prevention program. In July 1990 he was transferred to Decatur, Georgia, where he was an assistant to the training coordinator of the STD program. In April 1992 he was reassigned to the headquarters of the STD program, where he developed training materials and taught courses in supervision and management, as well as in STD and HIV. A 1985 graduate of the University of Central Arkansas with a BS in health education and sociology, Ralph has an MPH from the University

of Tennessee. He transferred to the Iowa TB program on October 17.

CALENDAR OF EVENTS

February 11-13, 1994

50th Annual Midwest Clinical Conference

Chicago, Illinois

Christine Ricker

Chicago Medical Society

(312) 670-2550

February 17-18, 1994

Midwestern Conference on Tuberculosis

Working Together to Eliminate Tuberculosis

Indianapolis, Indiana

Sharon Boggs

American Lung Association of Indiana

(317) 573-3900

March 21-25, 1994

TB Today!

Atlanta, Georgia

Judy Daugherty-Gibson

Centers for Disease Control and Prevention

(404) 639-8135

April 18-22, 1994

Postgraduate Course on Clinical Management and Control of Tuberculosis

Denver, Colorado

Catheryne J. Queen

National Jewish Center

for Immunology and Respiratory Medicine

(303) 398-1700

May 21-25, 1994

1994 American Lung

Association/American Thoracic Society

International Conference

Boston, Massachusetts

Deborah Richardt

American Lung Association

1740 Broadway

New York, NY 10019-4374

(212) 315-8781

October 12-16, 1994

Frontiers in Mycobacteriology

Multidrug-Resistant Tuberculosis

Where Do We Stand; Where Are We Headed?

Vail, Colorado

Dr. James Cook

National Jewish Center

for Immunology and Respiratory

Medicine

(303) 398-1359

***TB Notes* Readers Poll**

We would like to know your opinion of *TB Notes*. Please take a few minutes to answer the following questions so that we can respond to your needs. Send the completed form to

Editor, *TB Notes*
Division of TB Elimination (MS E-10)
Centers for Disease Control and Prevention
1600 Clifton Rd, NE
Atlanta, GA 30333

Thank you for your response.

1. Overall, how useful is *TB Notes*?

Not at all useful		Somewhat useful		Very useful
5	4	3	2	1

2. On a scale of 1 to 5 (1, very interesting; 5, not at all interesting), how interesting are these topics to you?

___ activities of state and local TB programs
___ new research (updates from the laboratory)
___ new CDC guidelines
___ news briefs
___ policy issues
___ behavioral science issues
___ new publications
___ personnel notes
___ other, specifically: _____

3. What features would you like to see added to *TB Notes*?

4. On the average, what percentage of each issue do you read? _____

5. What do you do with each issue when you are through with it?

___ file for future reference
___ pass along to supervisor
___ pass along to employees
___ pass along to colleagues
___ throw away
___ other, specifically: _____

6. Which category best describes your job?

- ☐ TB control officer or program manager for state, big city, or territory
- ☐ public health worker for city, county, district, or regional TB program
- ☐ program director for pulmonary or infectious disease training program
- ☐ epidemiologist or health officer for state or territory
- ☐ employee of national, state, or local lung association
- ☐ TB public health advisor for CDC
- ☐ other public health advisor for CDC
- ☐ employee of PHS regional office
- ☐ other, specifically: _____

7. How can *TB Notes* be improved?

Name (optional) _____

Attachment
1992 Program Management Reports